



# FIRE PROTECTION TRAINING

Procedures Handbook 4300

VEGETATION FIRES

---

**TOPIC:** FIRING EQUIPMENT

**TIME FRAME:** 45 Minutes

**LEVEL OF INSTRUCTION:** Level I

**BEHAVIORAL OBJECTIVE:**

*Condition:* A written examination

*Behavior:* The student will confirm knowledge, characteristics, and safety precautions of various types of commonly used firing devices

*Standard:* Within 80% accuracy according to the information contained in the lesson plan

**MATERIALS NEEDED:**

- Writing board with markers/erasers
- Appropriate audio-visual material/equipment

**REFERENCES:**

- Code of Federal Regulations, (49 CFR 175)
- Fire Line Handbook, NWCG
- FireQuick Flare Systems
- C-234, Intermediate Firing Methods, CAL FIRE, 2009

**PREPARATION:** Using fire to fight fire is a common wildland firefighting practice. There are many devices available; the two most common devices used are the drip torch and fusee. We will discuss these devices and others that may be used for firing. Like any other operation, knowing the right tool to use for the conditions will bring about the best result.

---

4320.18



# FIRE PROTECTION TRAINING

Procedures Handbook 4300

## FIRING EQUIPMENT

PRESENTATION	APPLICATION
<b>I. HAND HELD FIRING DEVICES</b>	<b>SL 5-1-1</b>
	<b>SL 5-1-2</b>
<b>A. Fusees</b>	<b>SL 5-1-3</b>
1. Used to ignite fine fuels	
a) grass	
b) Forest litter	
2. Characteristics	
a) Light weight	
b) Portable	
c) Produces a 2-4 inch flame	
d) Suitable for small projects	
e) Readily available	
f) Easily stored	
g) Available in 5 to 30 minute burn times	
h) Wands can be assembled	
i) Not the same as road flares	
1) Do not burn as hot or as long	
j) Classified as flammable solid	
	<b>SL 5-1-4</b>
3. Correct method to use	

4320.18



# FIRE PROTECTION TRAINING

Procedures Handbook 4300

## FIRING EQUIPMENT

PRESENTATION	APPLICATION
<ul style="list-style-type: none"><li>a) Back straight</li><li>b) Eyes and head pivoting</li></ul> <p>B. Drip torch</p> <ul style="list-style-type: none"><li>1. Characteristics<ul style="list-style-type: none"><li>a) Capable of handling most firing operations</li><li>b) Used to ignite all fuel types<ul style="list-style-type: none"><li>1) Forest litter</li><li>2) Grass</li><li>3) Brush</li><li>4) Ladder fuels</li><li>5) Heavy fuels</li></ul></li><li>c) Easily carried on engines and utility vehicles</li></ul></li><li>d) Parts<ul style="list-style-type: none"><li>1) Igniter assembly</li><li>2) Nozzle/igniter mount</li><li>3) Spout with fuel trap</li><li>4) Breather valve assembly</li><li>5) Tank cover chain assembly</li><li>6) Lock ring</li></ul></li></ul>	<p>SL 5-1-5</p> <p>SL 5-1-6</p>

4320.18

# FIRE PROTECTION TRAINING

Procedures Handbook 4300

FIRING EQUIPMENT	
PRESENTATION	APPLICATION
<p>e) Liquid fuel device</p> <ol style="list-style-type: none"> <li>1) Fill only <math>\frac{3}{4}</math> full</li> <li>2) 2 parts diesel fuel</li> <li>3) 1 part gasoline</li> <li>4) Fuel classified as a combustible liquid</li> </ol>	<p><b>SL 5-1-7</b></p>
	<p><b>SL 5-1-8</b></p>
	<p><b>SL 5-1-9</b></p>
<p>2. Application Methods</p> <ol style="list-style-type: none"> <li>a) Trail torch slightly behind you or...</li> <li>b) Swing torch back and forth beside body from front to back               <ol style="list-style-type: none"> <li>1) Do not swing torch side to side in front of body and walk through lit fire</li> <li>2) Only apply amount of fire necessary to achieve desired results</li> </ol> </li> <li>c) Extinguishment               <ol style="list-style-type: none"> <li>1) Upon completion of assignment or if standing by for extended periods, blow out wick</li> </ol> </li> </ol>	
<p>3. Drip Torch Safety</p> <ol style="list-style-type: none"> <li>a) Possible problems               <ol style="list-style-type: none"> <li>1) Defective vent/clogged</li> </ol> </li> </ol>	<p><b>SL 5-1-10</b></p>



# FIRE PROTECTION TRAINING

Procedures Handbook 4300

## FIRING EQUIPMENT

PRESENTATION	APPLICATION
<ul style="list-style-type: none"><li>2) Improper mix</li><li>3) Poor gasket seal</li></ul> <ul style="list-style-type: none"><li>b) Fuel may “spurt” out of spout when hot</li><li>c) Do not get unburned fuel on PPE</li><li>d) Maintain spacing with other crew members to ensure lit fuel does not hit anyone as it is applied</li></ul>	<b>SL 5-1-11</b>       <b>SL 5-1-12</b>
<p><b>NOTE:</b> Terra Torch requires separate and specific training prior to use.</p> <p>C. Terra Torch or power flame thrower</p> <ul style="list-style-type: none"><li>1. Characteristics<ul style="list-style-type: none"><li>a) Used when other ignition devices are ineffective</li><li>b) Range of up to 100 feet</li><li>c) Requires specialized training</li><li>d) Requires a crew of two or more</li></ul></li><li>e) Trailer mount<ul style="list-style-type: none"><li>1) Portable unit carried on truck or small trailer</li></ul></li><li>f) Skid mount</li></ul>	<b>SL 5-1-13</b>                <b>SL 5-1-14</b>                <b>SL 5-1-15</b>

4320.18



# FIRE PROTECTION TRAINING

Procedures Handbook 4300

## FIRING EQUIPMENT

PRESENTATION	APPLICATION
<ul style="list-style-type: none"><li>g) Fuel is a mixture of alumagel/surefire and gasoline</li><li>h) Dispenses fuel under pressure through a hand held nozzle</li><li>i) Classified as a flammable liquid</li></ul>	<b>SL 5-1-16</b>
<p>2. Hazards</p> <ul style="list-style-type: none"><li>a) Produces extreme amounts of radiant heat<ul style="list-style-type: none"><li>1) Rotate personnel</li><li>2) May need additional PPE for thermal protection</li></ul></li><li>b) Fuel mixing<ul style="list-style-type: none"><li>1) Follow proper procedure and safety precautions. Requires special training</li></ul></li></ul>	<b>SL 5-1-17</b>
<b>II. PROJECTED AERIAL DEVICES</b>	<b>SL 5-1-18</b>
	<b>SL 5-1-19</b>
<p>A. Very Pistol</p> <ul style="list-style-type: none"><li>1. Most effective in contiguous light fuels</li><li>2. Extended reach</li></ul>	<b>SL 5-1-20</b>
<ul style="list-style-type: none"><li>3. Characteristics</li></ul>	

4320.18



# FIRE PROTECTION TRAINING

Procedures Handbook 4300

## FIRING EQUIPMENT

PRESENTATION	APPLICATION
<ul style="list-style-type: none"><li>a) Specialized flare launcher requiring operator be qualified before use</li><li>b) Burn time of approximately 8 seconds at 1,400°F</li><li>c) 12 gauge and 25 MM</li><li>d) Classified as an explosive 1.4 and a flammable solid</li><li>e) Range up to 375 feet</li></ul>	<p><b>SL 5-1-21</b></p> <p><b>SL 5-1-22</b></p>
<p>4. Hazards</p> <ul style="list-style-type: none"><li>a) Firing<ul style="list-style-type: none"><li>1) Communicate to personnel when firing</li><li>2) Identify target</li><li>3) Hearing protection required</li></ul></li><li>b) Misfires<ul style="list-style-type: none"><li>1) Communicate to personnel when misfire occurs</li><li>2) Repeat firing sequence</li><li>3) If round doesn't fire<ul style="list-style-type: none"><li>• Keep pointed down range for three seconds</li><li>• Remove round</li></ul></li></ul></li></ul>	<p><b>SL 5-1-23</b></p>

4320.18



# FIRE PROTECTION TRAINING

Procedures Handbook 4300

## FIRING EQUIPMENT

PRESENTATION	APPLICATION
<ul style="list-style-type: none"><li>• Store in an approved container</li><li>• Ship to disposal facility</li></ul> <p>c) Accidental firing</p> <p>d) Ricochet</p> <p>B. FireQuick Flare Launcher</p> <p>1. Follow manufacturer's recommendations for use</p> <p>2. Use by qualified personnel <u>only</u></p> <p>3. Characteristics</p> <p>a) Specialized flare launcher, requiring operator training</p> <p>b) Uses 22 caliber blanks</p> <p>c) Launches 1 inch diameter flares</p> <p>d) Range up to 300 feet</p> <p>e) Burning time approximately 6 to 8 seconds at 4,000°F</p> <p>f) Aerial burst will cover an area 10 to 20 feet</p> <p>1) Monitor wind direction and speed</p> <p>g) Classified as a 1.4 explosive, and flammable solid</p>	<p><b>SL 5-1-24</b></p> <p><b>SL 5-1-25</b></p> <p><b>SL 5-1-26</b></p> <p><b>SL 5-1-27</b></p>

4320.18



# FIRE PROTECTION TRAINING

# Procedures Handbook 4300

FIRING EQUIPMENT	
PRESENTATION	APPLICATION
<p>4. Hazards</p> <ul style="list-style-type: none"> <li>a) Communicate to personnel before firing</li> <li>b) Hearing protection required</li> <li>c) Misfire               <ul style="list-style-type: none"> <li>1) Communicate to personnel when a misfire occurs</li> <li>2) Repeat firing sequence</li> <li>3) If round doesn't fire                   <ul style="list-style-type: none"> <li>• Keep pointed down range for thirty seconds</li> <li>• Remove round</li> <li>• Store in approved container</li> <li>• Ship to disposal facility</li> </ul> </li> <li>4) Treat faulty 22 caliber rounds the same as Very pistol rounds</li> </ul> </li> </ul>	<p><b>SL 5-1-28</b></p>
<p>5. Dud flares</p> <ul style="list-style-type: none"> <li>a) Identify flare location to personnel</li> <li>b) Do not approach flare until area is cooled off and flare is safe to approach</li> <li>c) Dispose of flare in accordance with disposal guidelines</li> </ul>	<p><b>SL 5-1-29</b></p>
	<p><b>SL 5-1-30</b></p>



# FIRE PROTECTION TRAINING

Procedures Handbook 4300

## FIRING EQUIPMENT

PRESENTATION	APPLICATION
<ul style="list-style-type: none"><li>6. Firing the launcher<ul style="list-style-type: none"><li>a) Load 22 cal. cylinder</li><li>b) Insert flare<ul style="list-style-type: none"><li>1) Checking directional arrow</li></ul></li><li>c) Communicate to personnel before firing</li><li>d) ID target</li><li>e) Aim at 45 degree angle</li><li>f) Pull trigger</li></ul></li></ul>	<p><b>SL 5-1-31</b></p> <p><b>SL 5-1-32</b></p> <p><b>SL 5-1-33</b></p> <p><b>SL 5-1-34</b></p>
<ul style="list-style-type: none"><li>C. Hand thrown flares<ul style="list-style-type: none"><li>1. 1.5 and 2.5 inch flares</li><li>2. Follow manufacturer's recommendations for use</li><li>3. Used in all fuel types</li><li>4. Characteristic<ul style="list-style-type: none"><li>a) Fuse burn time 30 to 40 seconds</li><li>b) Flare burn time approximately 6 to 8 seconds at 4,000°F</li><li>c) Ignited material will cover a 30 to 60 foot diameter</li></ul></li></ul></li></ul>	<p><b>SL 5-1-35</b></p>

4320.18



# FIRE PROTECTION TRAINING

Procedures Handbook 4300

## FIRING EQUIPMENT

PRESENTATION	APPLICATION
d) Classified as a flammable solid	<b>SL 5-1-36</b>
5. Preparing flare for use	
a) Expose fuse of flare	<b>SL 5-1-37</b>
b) Arrow on flare directs the direction of throw	<b>SL 5-1-38</b>
c) Light fuse of flare	<b>SL 5-1-39</b>
d) Throw flare	
1) Flare must be thrown a minimum of 100 feet from personnel, equipment and control lines	<b>SL 5-1-40</b>
	<b>SL 5-1-41</b>
<b>III. IGNITION DEVICES USED WITH AIRCRAFT</b>	
	<b>SL 5-1-42</b>
A. Helitorch	
1. Used in all fuel types	
a) Can ignite fuels with high fuel moisture	
b) Capable of burning standing fuel types and continuous surface fuel beds	
	<b>SL 5-1-43</b>

4320.18

# FIRE PROTECTION TRAINING

Procedures Handbook 4300

PRESENTATION		FIRING EQUIPMENT
		APPLICATION
2.	Produces large amounts of fire in a short period	<b>SL 5-1-44</b>
3.	Characteristics	
a)	Used as an external sling load under rotary wing aircraft	
b)	Uses aluma-gel /surefire and gasoline mix as fuel	
1)	Consult MSDS	
c)	Can reach areas not accessible by ground	<b>SL 5-1-45</b>
d)	Classified as a flammable liquid	
B.	Premo Mark III Plastic Sphere Dispenser or Aerial Ignition Device	
1.	Internal load	<b>SL 5-1-46</b>
2.	To be effective requires 1 hour fuel bed	
3.	Requires special training to operate	
4.	Requires less time to initiate than a helitorch	
5.	Ignition results from 1 cc of ethylene glycol being injected into the ball which is filled with potassium permanganate	<b>SL 5-1-47</b>
a)	This forms an exothermic (heat producing) reaction	





# FIRE PROTECTION TRAINING

Procedures Handbook 4300

FIRING EQUIPMENT

---

## ***SUMMARY:***

There are a multitude of tools available to light fire. We have looked at the tools currently available and their specific application. Though drip torches and fusees remain the primary firing tools, there are several other hand-held firing devices such as the Terra Torch. We also use projected aerial devices including the Very Pistol, FireQuick flare launcher and ignition devices used with aircraft; the Helitorch and the Plastic Sphere Dispenser. Personnel assigned to use these tools must be trained and qualified in the use of the particular item selected.

## ***EVALUATION:***

The student will complete a written examination.

## ***ASSIGNMENT:***

Review your notes and read the appropriate section(s) in your student manual. Study for the next session.